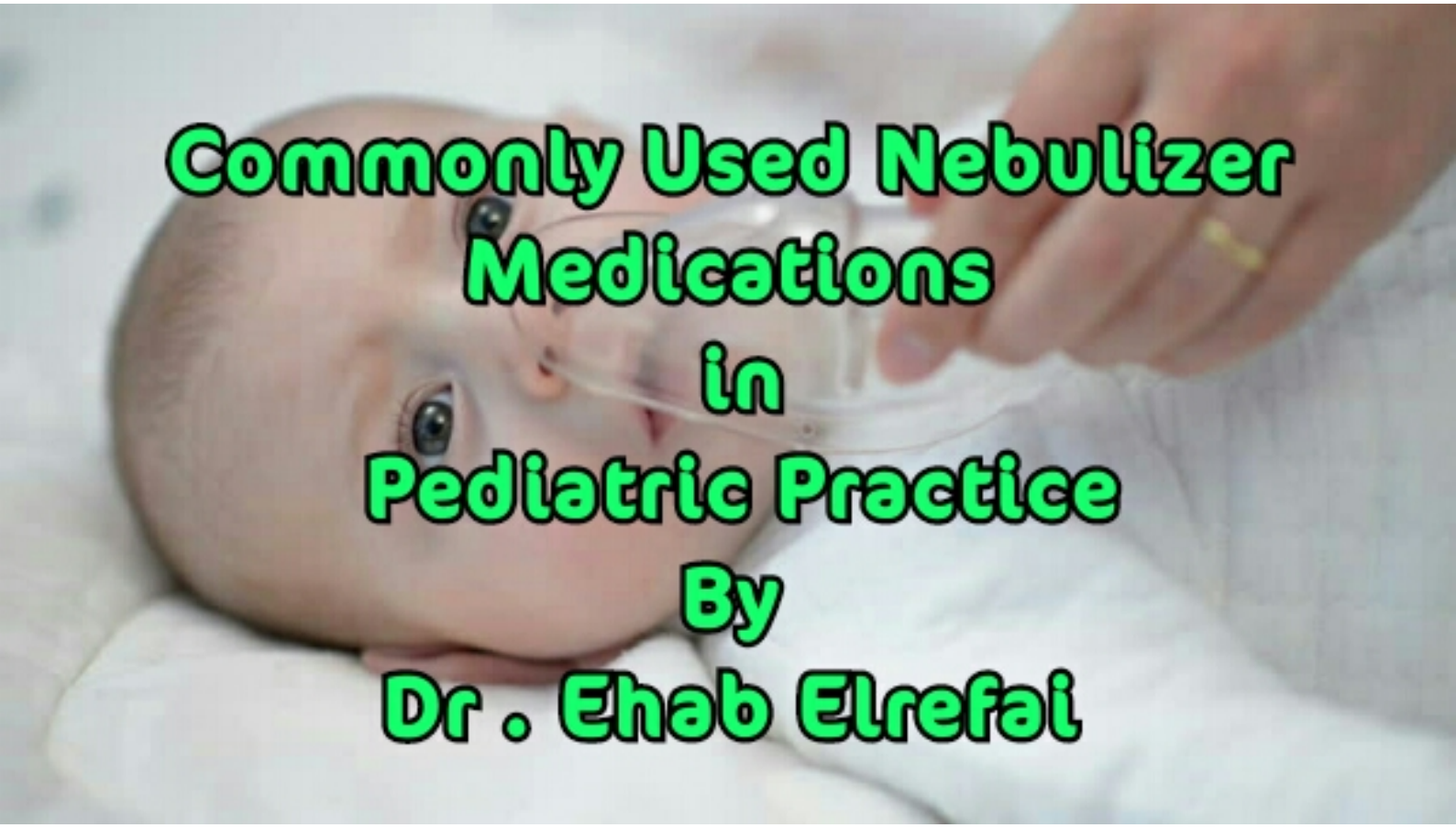
Commonly Used Nebulizer
Medications
in
Pediatric Practice
By
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Nebulizer Basics

* A nebulizer is a device that converts a liquid drug into an aerosol so that it can be inhaled into the lungs...
(Respirable particles = particles < 5 microns diameter) !

* Principles of proper nebulization technique in children :

→ It is important to use a minimum liquid medication of 3 ml and preferably 4 ml to deliver adequate % of prescribed drug...

→ You may need to add NS to the nebulizer chamber so that there are 3-4 ml of liquid total...

→ You can put more than one type of medicine in nebulizer chamber - if compatible...
(e.g. you can mix Ventolin / Atrovent / Pulmicort)

→ Most medicine will be given in 5-10 minutes. If treatment session takes > 15-20 minutes = machine not working well...

→ The lung dose delivered by ordinary jet nebulizers estimated to be < 10% ... So, try to optimize drug deposition (How ??)
- child sits in a relaxed upright position
- breathing pattern should be deep & slow through mouth
- crying ↓ lower airway deposition of aerosol medication to less than 1 %
- use tight face mask
- use high flow oxygen (8 L/M)

Indications of Aerosol Therapy

I To treat or reverse local pulmonary problems :

1- Bronchospasm
2- Inflammation
3- Thick secretions
4- Airway infections
5- Airway edema
6- Airway anesthetization
7- Sputum induction

II To deliver systemic drugs (New & Growing era) such as:

1- Vaccines
2- Insulin
3- Heparin
4- Antibiotics
5- Chemotherapy
6- Pain medications
7- Gene therapy vectors

Medications' .mp4 - VLC media player
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Drug Classes Administered by Aerosol Inhalation		
Drug Class	Indication	Condition/ Procedure
Bronchodilator	Bronchospasm	Asthma
Steroids	Inflammation	Asthma, Bronchopulmonary dysplasia
Mucolytics	Thick secretions	Cystic fibrosis
Antibiotics/ Antivirals	Respiratory tract infections	Cystic fibrosis, Compromised immune system
Anesthetics	Anesthetize airway reflexes	Airway procedures
Irritants	Induce sputum production	Diagnostic purposes

May be delivered as a controller for chronic pulmonary conditions

Inhaled Bronchodilators

B_2 Agonists, SABA

Salbutamol = Albuterol
(named by WHO) (named by US)

Brand Name is

Ventolin

first line short acting bronchodilator in acute asthma !

5 mg / ml (nebulizer solution)

Dose:

< 2 y
0.15 mg / Kg / dose
(= ٣ شرطات سيرنجة إنسولين ١٠٠ / كيج)

2-6 y
2.5 mg (= 0.5 ml)

6-12 y
2.5-5 mg (= 0.5-1 ml)

≥ 12 y
5 mg (= 1 ml)

" one nebulizer session q 20 min x 3 then q 4-6 h ... !

Anticholinergic

Ipratropium Bromide

Brand Name is

Atrovent

second line bronchodilator if incomplete response to salbutamol or severe attack from the start !

250 & 500 µg (nebulizer vials)

Dose:

< 2 y
25 µg / Kg / dose

2-6 y
250 µg

6-12 y
250 - 500 µg

≥ 12 y
500 µg

" one dose (added to ventolin) q 20 min x 3 then q 4-6 h (if required) ...!

Nebulized Steroid

Budesonide (Pulmicort)

Pulmicort Respules : 0.5 mg / 2 mL
1 mg / 2 mL

Asthma

- If given early in acute attack, proved to ↓ need for hospitalization in patients not receiving systemic steroids.
- Insufficient evidence that it can replace systemic steroids in treatment of acute asthma exacerbation.

approved <1 y

Prophylaxis

0 – 12 y
250 – 500 µg
twice daily
(max. 1 mg / day)

≥ 12 y
0.5 – 1 mg
twice daily
(max. 2 mg / day)

Treatment

0 – 12 y
0.5 – 1 mg
twice daily

≥ 12 y
1 – 2 mg
twice daily

Croup

- In USA, nebulized pulmicort has been 1st choice treatment of croup – even if it is mild.
- It can be mixed with adrenaline and administered simultaneously in cases of mod. to severe croup.

Dose

2 mg (= 4 mL)
for one dose

(it can be repeated q 12 h for a maximum of 36 h, or until clinical improvement)

Nebulized Adrenaline

Racemic Adrenaline

= 1:1 mixture of D- & L- isomers
2.25 % (nebulizer solution)

Dose:
0.05 ml / Kg / dose
(max. 0.5 ml / dose)

L- Adrenaline

= the type of adrenaline routinely used
1mg / ml amp. (1/1000 solution)

Dose:
0.4 ml / Kg / dose
(max. 5 ml / dose)

L- Adrenaline proved to be equally effective & safe as Racemic Adrenaline !
(معلومة في غاية الأهمية)
because Racemic Adrenaline is not available outside USA

Croup

- Nebulized adrenaline has become the standard treatment for mod. to severe croup in USA.
- Given the evidence that effects of a dose of steroid expected after 30 minutes, nebulized adrenaline should be used as early as possible in mod. to severe croup.
- Observe for 2-4 h after administration, due to potential for rebound obstruction.

Bronchiolitis

found to be effective in severe bronchiolitis by some trials

Nebulized Mucolytics

* Normal Saline (0.9%)

- 4 ml nebulized 2-3 times daily

* Hypertonic Saline (3%)

- more effective than NS
- bronchodilator such as salbutamol is often used before hypertonic saline to avoid risk of bronchospasm

* N-Acetylcysteine

- nebulizer solution (10% & 20%)
- 0-1 y 1-2 ml of 20% solution or 2-4 ml of 10% solution
  1-12 y 3-5 ml of 20% solution or 6-10 ml of 10% solution
  (q 6-8 h)

* Bromhexine (Bisolvon)

"2mg/ml nebulizer solution"

- < 2 y 5 drops q 12 h
- 2-6 y 10 drops q 12 h
- 6-12 y 1 ml q 12 h
- ≥ 12 y 2 ml q 12 h

* Ambroxol (Mucosolvan)

"15mg/2ml nebulizer solution"

- < 6 y 1 ml q 12 h
- ≥ 6 y 2 ml q 12 h

Magnesium Sulfate = $MgSO_4$

(لا تؤخذ قبل عمر سنتين)

I.V. Infusion

FDA approved
as 2nd line bronchodilator in severe & life-threatening asthma

or

when poor response to repeated maximal doses of other bronchodilators

Dose:

40 mg / Kg
(max. 2 g)
I.V. infusion over 20 minutes
« Single dose »

Nebulized

Still not FDA approved
but
recent studies suggest that nebulized combination of $MgSO_4$ & salbutamol may be best choice for management of acute severe asthma (esp. in early stage)

Dose:

Isotonic $MgSO_4$ solution

2 - 5 y
125 mg (1.5 ml)

5 - 12 y
250 mg (3 ml)

« q 20 minutes × 3 doses »